Saskatchewan Labour

Occupational Health and Safety

Safe Operation of Forklifts

Table of Contents

Introduction 1

The purpose of this guide 1

Summary of responsibilities of employers 2

Section A: Key elements of an effective forklift safety program 3

Introduction 4

Duties of self-employed persons 5

Duties of contractors 5

Duties of owners (of land, buildings, equipment, etc.) 6

Duties of suppliers 6

Duties of supervisors 7

Duties of workers 7

Duties of employers 7

Section B: Duties of employers 9

Introduction 10

Establish forklift selection criteria 11

Provide safe forklifts 11

Prepare rules for inspecting, testing, operating and maintaining equipment 12

Determine the competency of operators 13

Ensure that workers are adequately trained 14

Provide competent supervision 14

Section C: Safe operation 15

Introduction 16

Work practices and traffic management 16

Raising or lowering workers 18

Forklift exhaust 20

Work environment design 23

Competency of workers 24

Appendix: Resources 37

Acknowledgements 38

CCOHS Infograms 38

For more information 39

About this publication

Remember that this publication does not replace *The Occupational Health and Safety Act, 1993* and *The Occupational Health and Safety Regulations, 1996* (the Act and regulations). You still need to refer to the legislation to find out exactly what requirements apply to your organization. To order a copy of the legislation, contact:

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Workplaces with ten or more workers listed in Table 7 of the Appendix to the regulations must have an occupational health and safety program. Some of these workplaces use forklift trucks. If you must implement a program, read *Elements of an Occupational Health and Safety Program* and *Setting Up An Occupational Health and Safety Program: A Guide*. The Occupational Health and Safety Division provides both publications. For related regulatory information, read *The Occupational Health and Safety Act, 1993*, Part III and *The Occupational Health and Safety Regulations, 1996*, Part IV and section 22.

Introduction

Saskatchewan injury statistics suggest that forklifts pose a significant risk to workers who operate them or work nearby.

Investigations suggest that a variety of factors are involved, including a breakdown of basic safety systems involving:

- training
- organization
- people
- tools
- equipment
- the work environment

Experience suggests that many accidents could be prevented if regulatory requirements were better understood.

In Saskatchewan, *The Occupational Health and Safety Act, 1996* (the Act) places a duty on employers to "...ensure, insofar as is reasonably practicable, the health, safety and welfare at work of all of the employer's workers." Specifically, the employer is required to provide adequate training to workers on all matters that are necessary to protect their health and safety.

Part XI of *The Occupational Health and Safety Regulations – Powered Mobile Equipment,* places specific duties on employers regarding the selection, maintenance and operation of forklifts and other mobile equipment, including related training, instruction and supervision of workers. Training must ensure that operators are *competent* and can demonstrate that they have acquired the knowledge and skills needed to operate their equipment safely.

The purpose of this guide

This guide has been developed to reduce workplace accidents and injuries involving forklifts and help employers implement and maintain effective systems to ensure safe operations. It provides practical advice to assist employers to meet their obligations.

It does not deal with extending or telescoping boom material handling equipment.

Summary of responsibilities of employers

The Occupational Health and Safety Division (the Division) recommends that employers take these steps to protect workers operating forklifts or working near them:

- **Identify hazards** – identify how workers may be harmed
- **Provide information, instruction and training** – provide training, information and instruction to forklift operators and those who work near them about the hazards of the work and how to protect themselves
- **Provide competent supervision** – appoint competent supervisors and ensure that they are adequately trained to carry out their responsibilities
- **Establish rules for equipment maintenance, repair and modification** – prepare and use rules and procedures for the proper testing, maintenance, repair and modification of forklifts. Include rules governing the qualifications of those authorized to carry out these activities
- **Establish criteria for forklift selection** – select forklifts based on the requirements of the job and work environment
- **Provide safe operating procedures** – establish (preferably written) safe work practices and procedures
- **Use work environment design** – design and maintain the work environment so that it reduces the risks of accidents
- **Involve workers** – get input from the occupational health committee, the worker occupational health and safety representative, or where neither is required, the workers, in managing the safety of forklift operations

This publication presents the Division's recommendations about how employers should put these elements into place.

Section A:

Key elements of an effective forklift safety program

Key elements of an effective forklift safety program

- Duties of self-employed persons
- Duties of contractors
- Duties of owners (of land, buildings, equipment, etc.)
- Duties of suppliers
- Duties of supervisors
- Duties of workers
- Duties of employers

Introduction

Section 9 of the Act and regulation 12 require an employer or contractor to inform workers (including supervisors and managers) about hazards in the workplace. To satisfy these requirements, an employer or contractor must first identify the hazards. To do this, the Division recommends that employers and contractors take the following steps.

1. Identify how a worker who operates or works around forklifts may be harmed, considering the equipment involved, the jobs to be done and the workplace environment.
2. Prepare a written report specifying the potential sources of harm. The written report will be useful in ensuring that workers receive complete and consistent information about the hazards associated with their work.
3. Reassess potential risks if anything changes significantly (such as equipment, workers, loads, or the work environment). Make appropriate changes to the written report on hazards if necessary.

Several techniques may be used to identify hazards, including seeking advice from safety associations or other specialists, talking with supervisors and workers, reviewing information from manufacturers, analyzing work processes and analyzing data from incidents, accidents and injuries.[1]

[1] For more information, see the CCOHS Infogram J 13, *Common factors in forklift hazards*.

The dangers of the work require employers to take extensive measures to protect workers. Likewise, self-employed persons, owners, contractors, suppliers, workers and supervisors must help the employer to maintain safe working conditions.

Everyone must know and comply with applicable legislation. Ultimate responsibility for compliance is usually placed on the person with the greatest control over the situation. However, others are not absolved of their duties if this person does not comply. The law holds both individuals and organizations accountable.

Duties of self-employed persons

Self-employed persons operating forklifts must take all reasonably practicable steps to ensure their work does not endanger themselves or others. They are expected to cooperate with anyone who has a duty under the legislation and to know and comply with the legislation.

Duties of contractors

A contractor is an individual, partnership, or group that enters into a contract and directs the activities of one or more employers or self-employed persons involved in work at the place of employment.

Contractors are responsible for those things that are not under the direct and complete control of the employer. For example, if a warehouse company hires a firm to provide forklift services, the warehouse company becomes the contractor and is obligated to:

- eliminate or control the risks posed by tasks that are not under the direct and complete control of the forklift firm (the employer of the operators)
- inform the employer about hazards (processes, equipment, etc.)
- take appropriate measures to ensure that the employer complies with the legislation, allows only competent workers to operate forklifts and otherwise follows safe work practices

Duties of owners (of land, buildings, equipment, etc.)

An owner includes:

- a trustee, receiver, mortgagee in possession, tenant, lessee, or occupier of any lands or premises used or to be used as a place of employment
- anyone who acts for or on behalf of a person mentioned above

Owners must:

- inform employers, contractors and self-employed persons at the place of employment about hazards that may be present. For example, a building owner must inform the employer of forklift operators in the building about any structural problems with the facility, such as poorly lit or unstable travel areas
- promptly resolve health and safety concerns on their property that are not under the direct and complete control of the employer
- know and comply with applicable legislation

There are also circumstances when the owner is also the contractor (e.g., municipalities).

Duties of suppliers

Suppliers of equipment, such as forklifts that will be used by an employer, are expected to:

- ensure that their products are safe when used properly
- inspect their products before delivery
- provide information about the potential hazards and limitations of their products
- provide written instructions about how to use and maintain their products safely

Where a supplier is responsible for maintaining a forklift, the employer may ask the supplier to provide a schedule showing the nature and frequency of testing and maintenance before the rental/leasing arrangement is finalized. The employer can then monitor the supplier's compliance with the testing and maintenance schedule.

Duties of supervisors

A supervisor is *any worker given authority to direct the activities of other employees*. Effective front-line supervision is critical to maintaining a healthy and safe workplace.

Supervisors are expected to:

- know the job
- understand how to control hazards
- ensure that their workers know and comply with safe work practices and legislation
- supervise workers effectively
- set an example by working and acting safely

Supervisors assigning a worker to operate a forklift must ensure that the worker is competent and closely supervised until the worker can work safely.

Duties of workers

Workers are expected to:

- use the training, instruction and personal protective equipment provided by the employer
- work and act safely
- follow health and safety rules and work procedures established by the employer
- know and comply with the legislation

Duties of employers

The employer is expected to take all reasonably practicable measures to protect the health and safety of forklift operators and others who may be endangered by operations.

The next section discusses how employers can accomplish this.

Section B:

Duties of employers

Duties of employers

- Establish forklift selection criteria
- Provide safe forklifts
- Prepare rules for inspecting, testing, operating and maintaining equipment
- Determine the competency of operators
- Ensure that workers are adequately trained
- Provide competent supervision

Introduction

The employer must ensure that supervisors and workers are trained about everything that is relevant to their duties. Regulations made under *The Occupational Health and Safety Act, 1993* (the Act) require employers to ensure that a worker who is assigned to operate a forklift is "competent" to do so.

The regulations define **competent** as: "...possessing the necessary knowledge, experience and training to perform a specific duty."

Train means "...to give information and explanation to a worker with respect to a particular subject matter and require a practical demonstration that the worker has acquired knowledge or skill related to the subject matter."

However, the regulations do not indicate the knowledge that an operator must have, or the skills that an operator must demonstrate, to meet the definition of competent.

A **competent/qualified** operator is one who knows:

- the hazards associated with the work
- how to operate the particular forklift(s) to which the worker has been assigned
- how to operate forklifts in a way that protects the operator's health and safety as well as the health and safety of others

This section reviews how the employer can ensure that forklifts are used safely.

Establish forklift selection criteria

- Ensure that the fire hazard designation, carrying capacity, reach capabilities and other features of the forklift selected to do a job are suitable for the types of loads to be handled, the terrain over which loads will be carried, the atmospheric conditions in the workplace and the design of the workplace.

  For example, gas, petrol or diesel operated forklifts should not be used where explosive concentrations of flammable gases or vapours may be present. They should not be operated where exhaust gases may create a hazard of carbon monoxide poisoning. Ensure that forklifts being considered for purchase have speed ranges appropriate to work applications.

- Review the controls of the forklifts being considered for purchase or rental. Do they work the same way as the controls on other forklifts at the workplace? Try to select forklifts with standardized controls so operators can get used to performing the same task the same way on different equipment.

Provide safe forklifts

- Ensure operators are protected against falling or intruding materials by using suitable screens, guards, grills, or structures such as falling object protective structures (FOPS). FOPS must be suitable and adequate to protect the operator. If applicable, they must be designed, manufactured and installed to meet the requirements of an approved standard.
- Ensure that every forklift clearly displays a load chart showing the maximum rated load and the variation of the rated safe load capacity with the reach of the equipment. If the forklift has been modified, the chart must be changed to reflect new load ratings.
- Ensure that forklifts are equipped with warning devices and lights that are appropriate for the work environment. Provide units with backup warning devices to alert workers who could come into operating zones.
- Ensure that an adequate platform and an adequate work procedure is developed when workers are being raised or lowered by a forklift.
- Ensure that operators always correctly use a seat belt or some other approved restraining device.

For more information, see the reference material in section C of this manual, as well as CCOHS Infogram J 12, Ergonomics.

Prepare rules for inspecting, testing, operating and maintaining equipment

Inspecting, testing and operating

Prepare written instructions on the nature and frequency of inspections, testing and maintenance. Consider potential hazards involved in both the work and environment. Ensure that the instructions are equivalent to the minimum requirements established by the manufacturer and any applicable regulations.

Maintenance instructions should require verification of the lifting capabilities of the forklift **before** it is used for the first time. Maintenance instructions should also indicate how often the adequacy of the lifting capabilities, the mechanical fitness and vehicle emissions must be checked.

Allow **only** people whose training and experience provide them with expert knowledge to perform inspections, testing or maintenance. Ensure that they comply with applicable written work procedures.

Repairing

Ensure that only qualified manufacturers' representatives, qualified mechanics, or engineers repair, modify or replace any part of a forklift. The training and experience of these people should provide them with expert knowledge of the effects of repairs and modifications on the safety factors and operation of the forklift(s).

Records of operation, etc.

Ensure that a record is kept at the workplace of any inspection, testing, maintenance, repair or modification to the forklift(s) and the name(s) and qualifications of the person(s) doing the work.

For more information, see the following reference material in section C of this manual:

- *Raising or lowering workers*
- *Forklift exhaust*
- *Work environment design*

Read the following *CCOHS Infograms* for more information:

- *J 01 General safety rules*
- *J 02 Operator's daily check*
- *J 04 Maintaining control*
- *J 05 Maintaining stability*
- *J 06 Load handling*
- *J 07 Loading and unloading vehicles*
- *J 08 Batteries*
- *J 09 Safe handling of propane (LPG)*

Determine the competency of operators

The regulations require an employer or contractor to ensure that a person assigned to operate a powered lift is "competent" to do so.[2] Before assigning a worker to operate a forklift without direct supervision, ensure that the worker has achieved and can demonstrate the appropriate standards specified as final outcomes in section B of this manual. [3] The introduction to section B includes recommendations on how an employer or contractor may ensure that a worker has met the required standards.

For more information, see the information in section C, C*ompetency of workers*.

[2] See page 9 for the definition.

[3] **"Train"** means to give information and explanation to a worker with respect to a particular subject-matter and require a practical demonstration that the worker has acquired knowledge or skill related to the subject-matter.

Ensure that workers are adequately trained

Employers have a responsibility to provide information and training to workers and supervisors that will equip them to protect their health and safety. Training should be documented and include any information the employer has that:

- involves specific training associated with the operation of forklifts
- may affect the workers' health and safety
- is necessary to identify and control hazards at the site
- includes information specified in the legislation

Before starting work, new and inexperienced workers must be orientated and trained about:

- work rules and safe work procedures, such as those around forklift operations, including procedures for the safe handling of loads
- the location of first aid facilities
- restricted or prohibited areas on the site
- how to protect themselves from hazards
- applicable health and safety regulations

Provide competent supervision

Appoint trained and experienced supervisors who know:

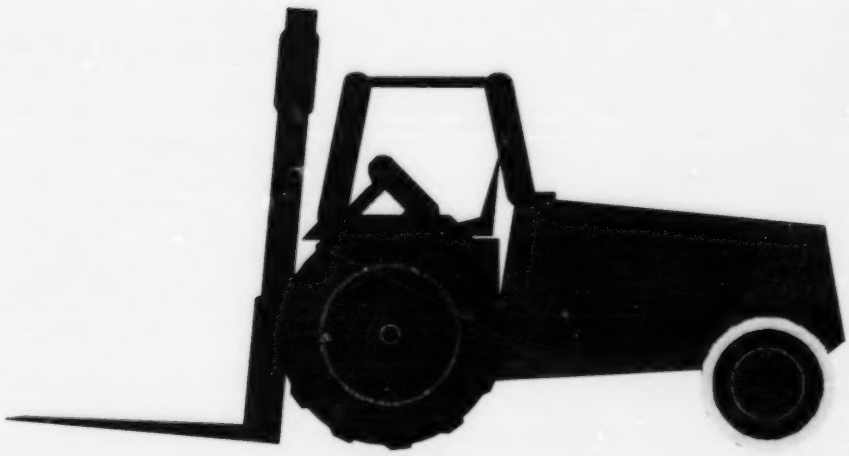
- the hazards associated with the type of forklift being used
- the loads being handled
- the environment in which the forklift will be operated
- how to immediately identify and correct unsafe acts and conditions

Encourage supervisors to be vigilant about promptly identifying and correcting unsafe acts or conditions.

For more information, see CCOHS Infogram *J 03, The competent operator,* and applicable material in section C.

Section C:

Safe Operation



Safe operation

- Work practices and traffic management
- Raising or lowering workers
- Forklift exhaust
- Work environment design
- Competency of workers

Introduction

This section discusses how the employer can protect operators and others in the work environment. It pays particular attention to preventing harm from exposure to exhaust gasses, such as carbon monoxide (CO) and nitrogen dioxide (NO_2).

Work practices and traffic management

Accident investigations show that inadequate work practices and traffic management contribute to forklift fatalities and critical injuries. Implement these work practices and procedures to prevent accidents.

General operations

Ensure that:

- rules and safe operating procedures are in place to address specific hazards
- all employees who will operate or work around forklifts are informed about workplace hazards and are trained to follow rules and safe work procedures
- all employees know where to find written rules and procedures
- operators wear seat belts at all times
- supervisors and workers are promptly informed about changes to rules, procedures and working conditions

Handling loads

Ensure that:

- controls are attended by the operator whenever a load is raised and no part of a load passes over any worker
- the maximum rated load for each machine is never exceeded
- loads are handled as required by the height and weight restrictions on each forklift's load chart
- loads are carried as low as possible
- loads are secured if they may tip, fall or otherwise pose a hazard

Travel routes and pedestrians

Use a signaler whenever an operator does not have a clear view of the path. Make sure all signalers are instructed in a standard code of signals for managing forklift traffic.

Provide barriers, auditory and visual warning signs, backup alarms, designated walkways or other safeguards where pedestrians could be struck by forklifts. Enforce workplace traffic rules and speed limits.

Unattended forklifts

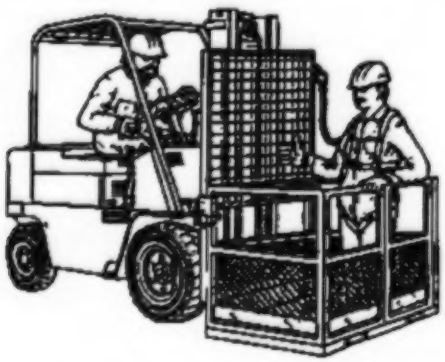
Immobilize every unattended forklift and secure it against accidental movement. Either lower or firmly support forks, buckets and other attachments.

Truck trailers and rail cars

Immobilize trailers and cars and secure them against accidental movement whenever a forklift must enter or exit. Chocks, or other suitable devices, must be used at all times. If chocks are used, consider tying them together with a piece of lightweight, galvanized aircraft cable instead of chain. This avoids the weight and rust problems associated with chain.

Consider using 'pallet jockey brackets' to help forklifts safely lift and remove difficult pallet loads from truck trailers.

Raising or lowering workers



A work platform must be provided to raise or lower workers and it should meet these standards:

1. The platform must be designed, constructed and used to safely support the maximum load that the platform is expected to support.
2. Pre-manufactured work platforms should conform to an engineering standard or be certified by a professional engineer.
3. The platform must be securely attached to the forks of the forklift to prevent accidental lateral or vertical movement.
4. The platform must be equipped with guardrails and toeboards that meet the requirements of regulations 122 and 123.
5. The platform must be equipped with a screen to prevent workers from contacting the mast drive mechanism.
6. The platform must have a label indicating its maximum safe working load.
7. If a worker is elevated on a work platform supported by a forklift:
   a) the operator must remain at the controls of the forklift
   b) the forklift mast is to be kept vertical
   c) the forklift must not be moved, except for minor adjustments that are necessary to position the platform
   d) the parking brake must be applied at all times when workers are being raised or lowered on a work platform

e) each person on the platform must use a personal fall protection system required by Part VII of the regulations if:

i) any part of the guardrail system has to be removed or lowered

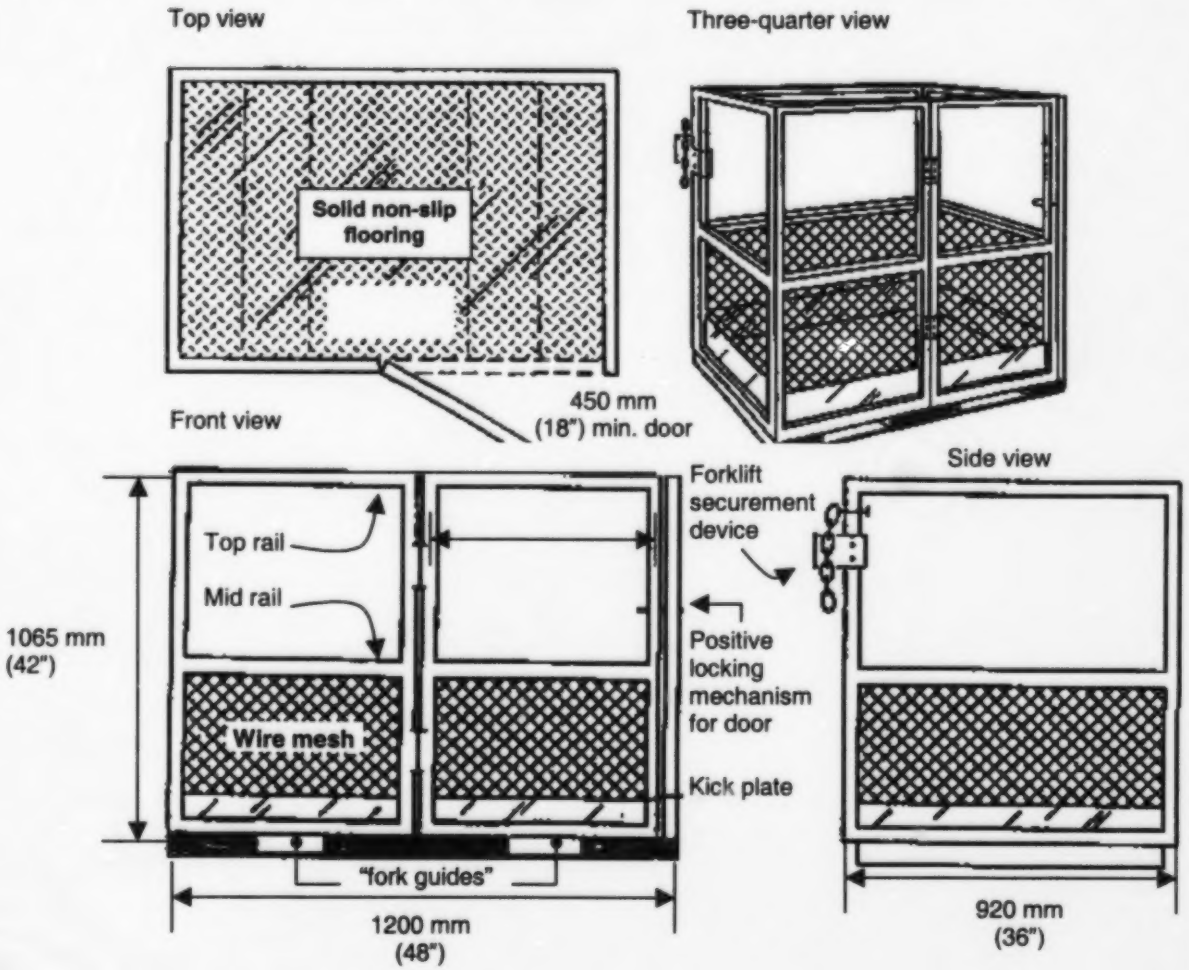
ii) the worker must work while the platform's gate is open

iii) the worker must lean outside of the guardrail

8. It is recommended that the platform be designed to support four times the maximum safe working load.

9. The platform must have a suitable fire extinguisher if workers on it are performing welding or cutting, or using open flames.

Examples



Forklift exhaust

Forklifts powered by propane, gasoline, and to a lesser degree diesel fuel, significantly contribute to carbon monoxide (CO) hazards in the workplace. Propane fuelled vehicles also emit potentially dangerous nitrogen dioxide (NO_2).

Here are some options to control the hazards of forklift exhaust.

Use equipment selection and modification

- **Use electric forklifts** to eliminate CO and NO_2 emissions. Factors that may limit the usefulness of electric forklifts include slower travel and lifting speeds, limited horsepower and difficulty handling long, steep ramps. Electric forklifts can also have difficulty in meeting 8-hour intensive duty cycles. Introducing electric forklifts may present higher initial costs (when batteries and electric chargers are included). In addition, handling and charging batteries can sometimes be hazardous.

- **Use catalytic converters** to reduce CO and NO_2 emissions (by up to 97%) on most forklifts. Considerations when purchasing catalytic converters include cost, the need to closely control the fuel-air mixture and the need to clean the converters periodically.

- **Regularly tune up forklifts** to reduce CO and NO_2 emissions. For propane or natural gas units, exhaust gas analysis should periodically be performed as part of the tune ups.

- **Use commercial soot traps** to help clean the exhaust from diesel-powered forklifts. These forklifts generate significantly less CO and NO_2 when compared to equivalent-sized propane and gasoline forklifts. Unfortunately, diesel soot from the exhaust system can foul products and the work environment. It can also irritate the eyes and nose. Therefore, commercial soot traps are recommended.

- **Consider using a cleaner-grade fuel,** such as diesel, with reduced sulfur content.

Use ventilation to keep CO and NO_2 levels lower than Saskatchewan WCLs

Workplace contamination limits (WCLs) are stated in milligrams per cubic metre of air (mg/m^3). In this section we've also provided the equivalent measurement in parts per million (ppm).

Carbon monoxide – Saskatchewan WCLs for carbon monoxide are:

- 29 mg/m^3 (25 ppm) averaged over an 8-hour workday and
- 220 mg/m^3 (190 ppm) averaged over any 15 minute period.

Nitrogen dioxide – Saskatchewan WCLs for nitrogen dioxide (NO_2) are:

- 5.6 mg/m^3 of air (3 ppm) averaged over an 8-hour workday and
- 9.4 mg/m^3 (5 ppm) averaged over any 15-minute period.

WCLs must be enforced at all times to protect the health and safety of workers.

Effective ventilation, although recommended, is costly since replacement air must be either heated or cooled depending on the season. It is therefore often more cost effective to use catalytic converters and/or other emission controls to ensure that your forklifts meet emission standards.

Ventilation guidelines

Ventilation guidelines are intended to help meet WCLs. Guidelines for an 8-hour workday have been suggested by the American Conference of Governmental Industrial Hygienists (ACGIH). These guidelines are:

- 5,000 cubic feet per minute (cfm) of fresh air for each propane-fuelled forklift and
- 8,000 cfm for each gasoline-fuelled forklift.

For longer shifts, contact the Division for advice.

These guidelines are merely 'rules of thumb' and only apply under the following conditions:

1. A regular maintenance program is provided which uses CO analysis of exhaust gas during final engine tuning.

   CO gas concentrations should be limited to one percent (10,000 ppm) for propane-fuelled forklifts and two percent (20,000 ppm) for gasoline-fuelled forklifts.

   For propane-fuelled vehicles, NO_2 must be analyzed in exhaust gases. Technicians trained in tuning propane-fuelled engines will use vehicle manuals to determine the recommended NO_2 emission levels.

2. The periods of forklift engine operation do not exceed 50 percent of the working day (total engine operation of forklifts is equal to less than four hours in an 8-hour shift).

3. Airflow is reasonably well distributed throughout the workplace.

4. The volume of space equals at least 150,000 cubic feet (ft^3) per forklift.

5. The forklift is powered by an engine of less than 60 horsepower (hp).

Where these conditions are not met, the following corrections should be made in the design of the ventilation rates:

1. For operating times greater than 50 percent of the total working time, multiply the basic ventilation rate by the actual operating time (expressed as a percent) divided by 50.

   For example, if a forklift were run 80 percent of a normal 8-hour workday, divide 80 by 50 and multiply by the suggested ventilation rate.

2. For forklifts with engines of more than 60 hp, multiply the ventilation rate by the actual horsepower and divide it by 60.

Use air monitoring to check the effectiveness of controls

Carbon monoxide should be monitored if forklifts with internal combustion engines are run indoors (gasoline-fuelled, propane-fuelled or diesel fuelled).

Nitrogen dioxide should be monitored if propane-fuelled vehicles are used.

Air monitors

Hand-held piston pump devices can be used to test for CO and NO_2 by direct reading colour changing tubes. Testing should be performed when maximum airborne levels are likely (during heavy use of forklifts, especially after several hours of use).

Direct reading monitors can be used to record CO and/or NO_2 levels throughout the workday.

Rechecking airborne levels at least monthly will reveal if conditions are deteriorating. If, for example, engine tuning is worsening, catalytic converters are losing efficiency or ventilation fans are running too slowly, air quality will suffer.

Air monitoring is strongly recommended for poorly ventilated work areas, such as coolers, train cars, truck trailers and unventilated storage warehouses to determine if enough fresh air is being supplied to the work environment. Additional ventilation equipment, such as portable ventilators, may be needed to control exhaust in these spaces.

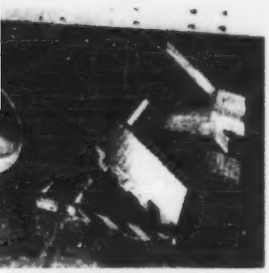
Work environment design

Poorly designed workplaces contribute to accidents and injuries. Therefore, employers should:

- Ensure that clearances in aisles, loading docks, doorways and rooms are large enough to permit the safe operation of each forklift. In particular, consider the adequacy of turning space for forklifts in loading and shipping areas. Review the safety implications of the location of walls, doorways, ramps, travel routes and pedestrian walkways. Consider the adequacy of staging and storage areas.

- Ensure that floors, aisles and passageways are kept clear of hazards.

- Ensure that gangway markings are clearly visible and that adequate traffic mirrors are installed and provide good visibility. Make sure that lighting is suitable and appropriate for the work performed. Consider the impact on operators of the lighting contrast between the outside dock area and inside work areas.



A dock-locking device

- Consider the feasibility of installing dock-locking devices for gripping Interstate Commerce Commission (ICC) bars or National Highway Traffic Safety Administration (NHTSA) rear underride guards attached to new trailers rated at or above 10,000 pounds Gross Vehicle Weight (GVW). These devices may reduce or eliminate the need for wheel chocking and prevent accidents from "trailer creep".
- Consider installing automatic dock levelers or redesigning the dock to avoid the use of dock plates. Damaged or improperly used dock plates account for a significant number of injuries.

Competency of workers

To establish a worker's competence to operate a powered forklift, an employer should ensure that the worker:

- has been informed of the hazards associated with operating a forklift in the particular workplace, including the hazards associated with the load, the design of the workplace and the environmental conditions
- knows how to protect himself or herself and others from hazards
- has demonstrated (to a person whose training and experience provides him/her with expert knowledge on the safe operation of forklifts) that the worker has acquired the skills and knowledge to do the job safely, or can show that he or she has successfully completed training requiring a practical demonstration of the mastery of skill and knowledge

Employers may wish to consult a safety association or the forklift manufacturer for information on institutions, agencies, or people with expert knowledge of forklifts.

Employers should maintain a record of workers competent to operate forklifts in the workplace. The record for each worker should show:

- the skills and knowledge successfully demonstrated or obtained
- the class or classes of forklift on which he/she was assessed
- the name and affiliation of the assessor and the date the assessment was done

To help identify competent operators, employers may issue certificates. For more information, see CCOHS Infograms J01-J09.

Knowledge required to be competent

A competent operator knows and understands:

- the hazards associated with the work, including the principles of operation and features of the forklift, workplace conditions and environment and activities that pose actual or potential danger to health and safety in the workplace
- the manufacturer's specifications related to the operation and safe load handling for the forklift(s) that the worker will be operating
- specific workplace safety practices and procedures
- legislation applying to the work

Skills required to be competent

A competent operator's performance of these tasks under typical workplace conditions must meet standards:

- **pre-operation check**
- **start-up and shut-down procedures**
- **general operation** – stopping, starting, turning, driving forward and in reverse, parking and operating around personnel
- **load handling** – selection and security of loads, pick-up and placement of loads, lifting workers, and stacking and destacking
- **loading and unloading** – transport vehicles, structures and elevators
- **operational maintenance** – such as refuelling and recharging (where appropriate)

Knowledge To Be Acquired		
Item	**Instructional Objectives**	**Final Outcomes for Operator Competence**
• Applicable legislation	• Identify applicable sections of the *Occupational Health and Safety Act* (the Act) • Identify applicable sections of the regulations made under the Act	A competent operator knows/understands: • a worker's duties • a worker's right to refuse work where health or safety is in danger • an employer's duties to protect workers • use of seat belts or other approved restraining devices • operating controls and handling characteristics of the forklift • requirements for lifting devices, material handling, motor vehicles, traffic control • requirements related to the handling of loads • requirements for protective equipment • forklift classification and designations • forklift stability triangle and trapezoid • what is meant by load centres • "centre of gravity" of forklift • centre of gravity of load • longitudinal and lateral stability • the effects of speed, acceleration, sharp cornering, height, attachment, grade/ramps and load security • operator blind spots associated with the design of the forklift (components, permanent equipment, attachment) • the main components of the forklift with emphasis on the lifting/handling systems and their basic functions • the factors affecting stability, reach/retract, counterbalance principles, tilt • the location of the capacity plate and the information outlined on the plate-model/serial number, capacity rating at a given load centre at a given height, maximum lifting height of forks/attachment, truck weight and minimum battery weight
• Review of features of the forklift	• Describe principles of operation • Describe features of the forklift	

Knowledge To Be Acquired		
Item	**Instructional Objectives**	**Final Outcomes for Operator Competence**
• Features of the forklift	• Manufacturer's specifications	A competent operator knows/understands: • where to get the Operator's Manual • the operating information outlined in the Operator's Manual • the pre-operational and maintenance tasks described in the Operator's Manual
• Hazards in the workplace	• Dangerous activities	A competent operator understands the dangers of: • operating with restricted visibility (blind spots, corners, intersections) • parking a vehicle on an incline • not stopping before entering an incline • travelling over railway tracks • allowing riders unless there is an approved passenger seat equipped with a seat belt • permitting anyone to stand/walk under loads or ride on loads • not keeping all parts of the body inside the operator's compartment at all times • travelling with the load lifted more than 10 cm above the floor • dragging the forks when inserting or withdrawing them from a load • exceeding the capacity of the truck or overloading the truck • stunt driving and horseplay • allowing anyone to stand on the forks or climb on the upright assembly • driving up to someone in front of a fixed object, e.g., wall, bench • moving a load with someone steadying it • jumping from the forklift in the event of a tip over • uneven surfaces • mast not tilted back far enough to stabilize the load

Knowledge To Be Acquired		
Item	**Instructional Objectives**	**Final Outcomes for Operator Competence**
• Hazards in the workplace (continued)	• Dangerous conditions	A competent operator understands the dangers of: • explosive atmospheres • operating on a slippery surface (floor, ramps, dock plate, etc.) • the accumulation of exhaust emissions (carbon monoxide) in restricted spaces such as railway cars, trucks, etc. • operating with restrictions such as overhead equipment and/or other obstructing stationary building structures • pedestrian traffic along the path of the travel route • workplace noise • inadequate lighting • other vehicular traffic
	• Emergency procedures	A competent operator knows/understands: • the emergency procedures defined by the employer • how to operate the particular type or class of fire extinguisher in the workplace
• Workplace specific procedures and practices	• Workplace specific rules and procedures	• the procedures and rules that have been established by the employer to ensure safe operation of forklifts in the workplace including: - rules where pedestrians have the right-of-way - codes of signals used to manage traffic (if any) - rules for maintenance, testing and repair of the forklift

Skills To Be Acquired		
Procedure	**Tasks To be Assessed**	**Final Outcomes for Operator Competence**
• General operation	• Pre-operational check (circle check)	Before operating a forklift, a competent operator: • uses a checklist provided by the employer to carry out a visual inspection of the truck and its attachments to ensure that all are in good operating condition • follows recommended procedures for daily inspections of oil and water levels
	• Start up	A competent operator: • uses the correct mounting procedure • assumes the appropriate driving position • ensures transmission/directional control lever in "Neutral" • ensures parking brakes applied • activates start button/switch • ensures warning system operating
	• Starting, stopping and turning	A competent operator: • starts and stops safely with and without a load • allows sufficient room for turning corners • operates at low speed when turning • uses appropriate steering techniques when turning in confined and limited spaces

Skills To Be Acquired		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
• General operation (continued)	• Shut down/parking	A competent operator: • brings the truck to a complete stop, sets the parking brake and returns the transmission/directional control lever to "Neutral" • lowers forks to the ground, tilts them forward • uses appropriate shut down procedures and turns off power supply • chocks wheels if risk of truck moving
	• Forward and reverse and driving on level ground	• keeps all parts of the body inside the operator's compartment at all times • ensures clear visibility in the intended direction of travel • if visibility is restricted, drives the truck in reverse or asks to be guided • keeps the load-engaging means or the load itself low (usually within 10 cm of the floor) and tilted backward • keeps safe operating distance from other lifting devices, pedestrians and machinery • observes traffic management rules established by the employer • drives at an appropriate speed, taking into consideration the type of device, the load, the pedestrian traffic along the path of the travel route, any obstructions and the condition of the driving surface • adjusts fork arms and/or attachments appropriately to maintain stability • observes weight restrictions for floors and elevators • takes appropriate action when meeting restrictions such as overhead equipment and/or other obstructing stationary structures

Skills To Be Acquired		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
• General operation (continued)	• Forward and reverse driving on inclines, ramps or uneven terrain	A competent operator: • when not carrying a load, travels forward down an incline and travels in reverse up an incline • when carrying a load, travels in reverse down an incline and travels forward up an incline • ensures that there is sufficient clearance for the forklift, operator and load prior to travelling on an incline or uneven terrain • does not turn the truck around on a ramp or incline • drives at an appropriate speed taking into consideration the effects of gradient on the truck and on load security • approaches the grade straight and not at an angle • operates in gear • ensures visibility is clear in the direction of travel • verifies that the incline does not exceed the maximum permissible slope
	• Operating around personnel	A competent operator: • always faces in the direction of travel • when turning, ensures no personnel within the truck's danger zone • observes employer's guidelines for ensuring the safety of pedestrians • if stopped at intersection, does not move until eye contact made with any personnel at intersection • maintains safe distance from pedestrians

Skills To Be Acquired		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
• Load handling	• Selection of loads	Before picking up a load, a competent operator: • assesses the weight distribution of the load and identifies limitations of the structures where the load has to be placed • ensures that load is within the rated capacity for the device, taking into account the job to be done • checks forks/attachments to ensure that they are safe to use with respect to capacity rating
	• Load pick up and placement	A competent operator: • checks overhead clearance • ensures truck safe distance from any live power lines • engages at least ⅔ (75% if possible) of the load length to be lifted and centres load evenly on forks • adjusts the tilting angle of the mast, height of fork arms and reach extension to stabilize load • ensures no loose articles lying on top of the load • does not drag the forks when inserting or withdrawing them from a load • does not raise or lower loads while truck is in motion
	• Load security and integrity	A competent operator: • observes the limits for free-standing stack height • makes sure load is secure and balanced before lifting

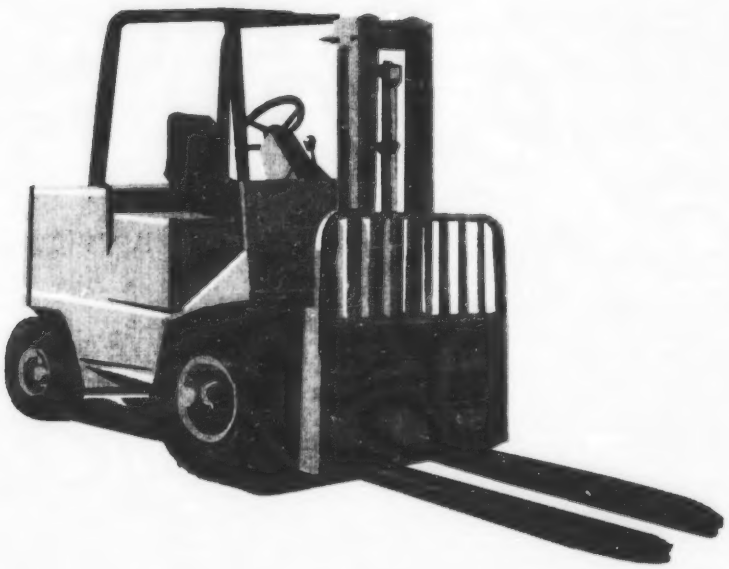
Skills To Be Acquired		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
• Load handling	• Stacking and destacking • Personnel lifting, lowering and supporting	A competent operator: • is able to stack safely the particular types of loads encountered in the workplace • ensures that pallets or skids are safe to be moved and stored; for example, ensures no broken runners or legs • ensures forklift meets prescribed requirements (see pages 20 and 21) • uses only a platform specifically designed and constructed to safely support the maximum load that the platform is expected to support (see regulation 194) • ensures that the platform is adequately secured to the forks • raises and lowers the platform to test its operation before allowing anyone on it • ensures that the person on the platform is secured as prescribed • keeps the upright in a vertical position • remains at the controls at all times while a person is on the platform • does not travel with personnel on the platform • ensures the safety of pedestrians in the area • ensures that the parking brake is applied at all times when workers are being raised or lowered on a work platform

Skills To Be Acquired		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
• Loading and unloading	• Loading trucks and railway cars	Before driving into any truck, trailer or railway boxcar, with or without a load, a competent operator: • ensures that the vehicle being loaded is adequately restrained to prevent movement • inspects floors for stability and integrity • ensures adequate lighting • ensures that the dock/bridge plate is one designed to support the mass of the loaded forklift • ensures that the dock/bridge plate is firmly in position • ensures the trailer is properly supported by a jackstand where appropriate (e.g., when not connected to the tractor)
	• Transporting loads in elevators	A competent operator: • ensures the elevator is capable of supporting the loaded forklift • before entering, makes sure the elevator floor is level with the building floor • if applicable, waits for the signal from the elevator operator before entering • ensures that no other person remains on the elevator with a truck and load on board • sets the brakes "on", lowers the load to the floor, places controls in neutral, shuts off the power and gets off the truck

Skills To Be Acquired		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
• Loading and unloading	• Unloading	A competent operator: • verifies that the structure where the load has to be placed is able to carry the weight of the load • when stacking loads, does not block access to fire extinguishers, exits, stairways, or other emergency equipment • ensures the load at the bottom is secure and levelled • tilts load forward • exits with forks level
• Operational maintenance	• Refuelling and recharging	A competent operator who will perform routine maintenance and has been trained to do so safely follows the manufacturer's requirements and employer's procedures for safe refuelling and recharging of forklifts including: • wearing the appropriate personal protective equipment, including eye protection • properly positioning and securing vehicle • observing workplace precautions with respect to fires

Appendix:

Resources



Acknowledgements

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1. The Canadian Centre for Occupational Health and Safety (CCOHS) for granting permission to use material from CCOHS *Infograms*. For more information, visit the Centre's site at: http://www.ccohs.ca/.

2. Manitoba Labour, Workplace Safety and Health Branch, for allowing us to use graphics from their Internet site, http://www.gov.mb.ca/labour/safety.

CCOHS Infograms

Resources Chart	
Topic in This Manual	**Appropriate CCOHS Infogram**
Hazard identification	J 13 Common factors in forklift hazards
Safe lift trucks	J12 Ergonomics
Safe operating procedures and work rules	J 11 Fork safety J 01 General safety rules
Maintenance	J 10 Maintenance
Safe operation	J 01 General safety rules J 02 Operator's daily check J 04 Maintaining control J 05 Maintaining stability J 06 Load handling J 07 Loading and unloading vehicles J 08 Batteries J 09 Safe handling of propane (LPG)
Ensuring workers are adequately trained	J 03 The competent operator

For more information

1. *Guideline for Safe Operation of Powered Lift Trucks*. Ontario Ministry of Labour, 1997.

   Publications Section
   Ministry of Labour
   400 University Ave., 9th Floor
   Toronto, Ontario
   M7A 1T7

   For more copies, telephone: (416) 326-7731; or e-mail: pubsale@gov.on.ca.

2. *Industrial Lift Truck Operator Training: Materials Handling and Logistics*. Canadian Standards Association (CSA), March 1994.

   For more copies, telephone: Main: (416) 747-4000; or visit the website: http://www.csa.ca/.

3. *Infograms*

   Canadian Centre for Occupational Health and Safety (CCOHS)
   250 Main Street E.
   Hamilton, Ontario
   L8N 1H6

   For CCOHS publications, telephone: (905) 572-2981;
   e-mail: custserv@ccohs.ca; or visit the website: http://www.ccohs.ca .

4. Manitoba Labour
   Workplace Safety and Support Services Division
   1000-330 St. Mary Avenue
   Winnipeg, Manitoba
   R3C 3Z5

   Website: http://www.gov.mb.ca/labour/safety

5. Visit the Saskatchewan Labour website at: www.labour.gov.sk.ca for more information.